

CLAIMS

1. A chromium alloy comprising hafnium.
2. A chromium alloy as claimed in claim 1 comprising up to 1 atomic% hafnium.
3. A chromium alloy as claimed in claim 2 comprising up to 0.5 atomic% hafnium.
4. An alloy according to any of claims 1 to 3 that is steel.
5. An alloy according to claim 4 that is stainless steel.
6. An alloy according to claim 5 that is ferritic grade steel.
7. An alloy as claimed in any of claims 1 to 6 wherein the hafnium is in the form of hafnium carbide.
8. An alloy as claimed in any of claims 1 to 7 wherein the hafnium is in the outer 1-2 μ m of the alloy.
9. An alloy according to any preceding claim comprising less than 12wt% chromium.
10. An alloy according to claim 9 comprising less than 10wt% chromium.
11. An alloy according to any preceding claim which contains one or more of the elements selected from Groups 3 to 16 of the periodic table.

12. An alloy according to claim 11 which contains one or more of the elements selected from Groups 3 to 12.

13. An alloy according to claim 12 wherein the elements are selected from aluminium, molybdenum, titanium, carbon, silicon, manganese, phosphorous, sulphur, nickel, vanadium, niobium, tungsten and nitrogen.

14. An alloy according to claim 13 comprising vanadium, niobium, molybdenum and nitrogen.

15. A supercritical power plant comprising an alloy as claimed in any of claims 1 to 14.

16. A method for the manufacture of steel, the method comprising the steps of:

(i) addition of hafnium to steel;

(ii) heat treating the steel formed in step (i).

17. A method as claimed in claim 16 wherein the steel is a chromium alloy.

18. A method as claimed in claim 17 wherein the steel is stainless steel.

19. A method as claimed in claim 18 wherein the steel is ferritic grade steel.

20. A method as claimed in any of claims 16 to 19 wherein the steel contains up to 10 wt% chromium.

21. A method as claimed in any of claims 16 to 20 wherein the steel alloy contains one or more of the elements of Groups 3 to 16.

22. A method as claimed in claim 21 wherein the steel alloy contains one or more of the elements of Groups 3 to 12.

23. A method as claimed in claim 21 or 22 wherein the steel alloy contains one or more of aluminium, molybdenum, titanium, carbon, silicon, manganese, phosphorous, sulphur, nickel, vanadium, niobium, tungsten and nitrogen.

24. A method as claimed in any of claims 16 to 23 wherein the hafnium is implanted in the steel.

25. A method as claimed in any of claim 24 wherein the hafnium is added by ion implantation.

26. A method as claimed in claim 25 wherein the ion implantation is applied to the surface layer of the steel.

27. A method as claimed in claims 24 to 26 wherein the hafnium is implanted in the outer 1-2 μm surface of the steel.

28. A method as claimed in any of claims 16 to 27 wherein up to 1.0 at% hafnium is added to the steel.

29. A method as claimed in claim 28 wherein up to 0.5 at% hafnium is added to the steel.

30. A method as claimed in any preceding claim wherein the steel is heat treated in step (ii) to a temperature of 700-760°C.

31. A method as claimed in claim 30 wherein the heat treatment is for 1 to 2 hours.

32. A method for the manufacture of steel suitable for use in super critical power plants as claimed in any of claims 16 to 31.
33. A method for the introduction of hafnium into steel characterised in that the hafnium is added directly to the steel by ion implantation.
34. Use of hafnium in the manufacture of steel.
35. Use as claimed in claim 34 wherein the steel is stainless steel.
36. Use as claimed in claim 35 wherein the steel is ferritic grade steel.
37. Steel obtainable by the method of any of claims 16 to 33.
38. Steel or a method as substantially hereinbefore described.